

GAO

Report to the Honorable
Daniel Patrick Moynihan, U.S. Senate

September 1991

SOVIET ECONOMY

Assessment of How Well the CIA Has Estimated the Size of the Economy



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Accession Number: 5339

Publication Date: Sep 30, 1991

Title: Soviet Economy: Assessment Of How Well The CIA Has Estimated The Size Of The Economy

Corporate Author Or Publisher: U.S. General Accounting Office, GAO, Washington, DC 20548 Report
Number: GAO/NSLAD-91-274

Descriptors, Keywords: Soviet GAO CIA USSR Economy Estimation Intelligence GNP Assessment Ruble
Cost Comparison Program International

Pages: 51

Cataloged Date: May 19, 1995

Copyrighted or Not: N

Document Type: HC

Number of Copies In Library: 000001

Record ID: 30027

Source of Document: GAO

National Security and
International Affairs Division

B-240396

September 30, 1991

The Honorable Daniel Patrick Moynihan
United States Senate

Dear Senator Moynihan:

As you requested, we have reviewed the Central Intelligence Agency's (CIA) methods for estimating the size of the Soviet Union's economy. In this report we discuss how well the Agency has calculated Soviet gross national product, both in rubles and as a percent of U.S. gross national product. We also discuss the prospects for future improvements in the Agency's estimates.

The future course of events in the Soviet Union is now very uncertain. It is highly possible that this uncertainty will affect the Agency's future role in and methods for assessing the size of the Soviet economy. Our recommendations for improving the CIA's estimates are therefore conditioned on the need for the Agency's continuing role.

We plan no further distribution of this report until 30 days from the date of this report, unless you publicly announce its contents earlier. We are sending copies of this report to the Director of the Central Intelligence Agency; the Secretaries of Commerce, State, and Defense; and any other interested parties. Copies will also be made available to others on request.

This report was prepared under the direction of Allan I. Mendelowitz, Director, International Trade, Energy, and Finance Issues, who may be reached on (202) 275-5889 if you or your staff have any questions. Other major contributors are listed in appendix III.

Sincerely yours,



Frank C. Conahan
Assistant Comptroller General

DATA QUALITY INSPECTED

Executive Summary

Purpose

The Central Intelligence Agency's (CIA) estimates of Soviet gross national product (GNP) have been increasingly criticized in recent years. By 1990, some non-CIA analysts had variously concluded that Soviet GNP was anywhere from 14 to 33 percent of U.S. GNP—rather than the 51 percent as estimated by the CIA—and growing at lower rates than estimated by the CIA.

Because of this lack of consensus, Senator Daniel Patrick Moynihan asked GAO to review the CIA's estimates. In response, GAO assessed how well the CIA has estimated Soviet GNP in rubles and as a percent of U.S. GNP, and identified the long-term prospects for improving estimates of Soviet GNP.

The CIA refused to cooperate with GAO during its review. GAO therefore did not have access to CIA files and analysts, which constrained GAO's ability to pursue certain tests of the CIA's assumptions. Despite this impediment, GAO believes that its review—based on a thorough examination of published CIA materials and meetings with experts—is adequate to support its conclusions and recommendations.

The momentous changes taking place in the Soviet Union in the wake of the failed August 1991 coup are very likely to affect the CIA's future role in and methods for assessing Soviet GNP. GAO's recommendations are therefore conditioned on the need for a continued CIA role in estimating Soviet GNP.

Background

A nation's GNP is the market value of the final goods and services that it produces annually. Western efforts to estimate Soviet GNP have been hampered by flaws in Soviet economic statistics; Soviet nonmarket prices; and a potentially large, unofficial "second economy" of private activities that are not included in Soviet official statistics.

The CIA uses adjusted Soviet data to estimate Soviet GNP in rubles for a base year—currently 1982. It bases its estimates of GNP for later years on its estimates of the growth of each sector of the economy, such as agriculture, since the base year. In addition to these ruble estimates, the CIA also calculates Soviet GNP as a percentage of U.S. GNP. It uses ruble-dollar ratios—derived from the prices of goods and services in each country—to convert U.S. GNP from dollars to rubles and Soviet GNP from rubles to dollars. Because the resulting comparisons of the two economies—one in rubles and the other in dollars—yield different results, the

CIA averages them (by calculating their geometric mean, or square root of their product) to present the estimate as a single figure.

Results in Brief

The CIA's methods for estimating Soviet GNP are, where possible, consistent with western national income concepts. However, these methods are unlikely to produce accurate results, primarily due to data limitations and problems inherent in estimating a nonmarket economy's GNP. If the CIA continues its GNP estimating work, many key research issues, such as the continued utility of quantity data used to estimate growth, deserve further scrutiny. The Agency has established a task force to review its analyses but has not indicated the specific areas the task force intends to review.

The CIA's weakest estimate is its comparison of Soviet and U.S. GNP, primarily due to (1) inherent difficulties in the method used to compare the two economies and (2) the Agency's failure to update its ruble-dollar ratios since the 1970s. The latter could be a significant source of error given GAO's finding that the comparison estimate is relatively sensitive to changes in the ratios.

As a result, the CIA has probably overstated the relative size of the Soviet economy, although the overstatement could be offset by errors in the ruble estimate. The problems with the CIA's comparisons suggest that using a single number to depict the relative size of Soviet GNP lends the estimate an unjustified air of precision. The CIA's estimate (most recently, 51 percent) also represents the average of two individual ruble and dollar value comparisons (39 and 66 percent, respectively) that are separated by a large gap—further illustrating the difficulty in comparing nations with very different economic structures.

Even prior to the August 1991 coup attempt, developments in the Soviet Union offered some hope that, in the longer term, western estimates of Soviet GNP could become more accurate, and perhaps ultimately less necessary. The current dramatic move toward political and economic reform could further affect the point at which the CIA would no longer need to prepare an independent estimate of Soviet GNP.

GAO's Analysis

CIA Estimates of Soviet GNP in Rubles

In calculating Soviet GNP for the base year estimate, the CIA organizes available data into a GNP accounting framework and uses a reasonable method to sum the value of these accounts to calculate total GNP. When the CIA cannot use standard practices, it has made defensible alternate choices. For example, the CIA relies largely on quantity data to estimate growth rates (instead of the standard approach of using data measured in deflated, or constant, prices) because it lacks reliable Soviet constant ruble data and ruble deflators.

Nevertheless, the CIA's methods are unlikely to produce accurate ruble estimates of Soviet GNP because they are subject to a variety of inherent biases that stem largely from Soviet data limitations. These include the biases that result from the use of quantity and value data and uncertainty over the size of the second economy.

CIA Comparisons of U.S. and Soviet GNP

The CIA uses an internationally accepted method of constructing ruble-dollar purchasing power ratios to compare Soviet GNP with U.S. GNP. However, this method has unavoidable drawbacks in comparisons involving nations with very different economies. Because of difficulties in allowing fully for the inferior quality and limited variety of their goods and services, nonmarket economies such as the Soviet Union can appear larger than they are in comparisons with market economies.

Compounding these methodological limitations is the CIA's failure to update its purchasing power ratios for individual items since the late 1970s. The CIA updated its aggregate ratios to 1982, but its continued use of the old, detailed ratios may further overstate Soviet GNP because the sample used to construct them may increasingly overrepresent low-technology Soviet goods. The CIA's ability to revise the ratios in the near future may be hampered by increasing economic turmoil.

GAO conducted rough sensitivity analyses of the impact of changes in certain variables on the comparison estimate and found that the comparison was relatively sensitive to inaccuracies in purchasing power ratios. For example, if the CIA had overestimated the ruble's purchasing power by 20 percent, Soviet GNP would be 42 percent of U.S. GNP; if the overestimate were 50 percent, Soviet GNP would be 34 percent of U.S. GNP.

A large gap has separated the individual dollar and ruble comparisons of Soviet and U.S. GNP on which the average estimate is based. Wide gaps are not unusual in comparisons of countries with greatly differing price and output structures.

Prospects for Change

Even prior to the coup attempt, the Soviets had endorsed the concept of transforming their planned economy into a market economy. They had indicated interest in improving their statistics and using GNP accounts and had begun conducting technical exchanges with the West and publishing GNP estimates. They also became involved in a United Nations-sponsored program of international comparisons.

Increasing Soviet openness and improvements in Soviet data could enhance the West's ability to accurately estimate Soviet GNP. Further, as the Soviet Union, or any succeeding confederation of republics, moves toward a market economy, the need for an independent U.S. estimate could diminish and at some point disappear. Soviet and international agencies could eventually supplant the CIA as the primary source of Soviet GNP data.

Recommendations

If conditions in the Soviet Union necessitate that the CIA continue to estimate Soviet GNP, GAO recommends that the Director of the CIA

- direct the CIA task force to address key research issues affecting the CIA's Soviet GNP estimates, to the extent that it has not already planned to do so;
- present the CIA's comparison estimate as a range rather than a single point estimate and explain the criteria and methodology used to calculate the range; and
- collect Soviet price data to recalculate purchasing power ratios as soon as Soviet economic conditions allow—unless the CIA chooses to adopt the results of other comparison efforts, such as the ongoing United Nations-sponsored international comparison of Soviet GNP.

Agency Comments

In commenting on a draft of this report, the CIA characterized it as a well-balanced appraisal. The Agency did not offer specific comments on GAO's conclusions and recommendations.

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Abbreviations

CIA	Central Intelligence Agency
GAO	General Accounting Office
GNP	gross national product
ICP	International Comparison Program

Introduction

For several decades the U.S. government has analyzed the economic performance of its Cold War adversary—the Soviet Union. Changes in the Soviet economy's production potential and the allocation of resources among its various sectors can provide important clues to Soviet intentions and capabilities. However, reliable estimates of the size, allocation, and growth of Soviet gross national product (GNP) have been difficult to obtain.

Because satisfactory estimates of Soviet economic activity were not available, the U.S. Central Intelligence Agency (CIA) began analyzing Soviet economic performance in the 1950s and eventually became the principal source of western estimates of Soviet GNP. Recently, the CIA's estimates have come under increasing attack by critics who charge that the Agency has seriously miscalculated both the growth of Soviet GNP and its size relative to U.S. GNP. The deepening Soviet economic crisis has also raised questions about the estimates' continued usefulness and the validity of some of the CIA's assumptions. The CIA's role in and methods for estimating Soviet GNP are likely to be further challenged in view of the dramatic changes occurring in the Soviet Union in the wake of the failed August 1991 coup. Given these uncertainties, we have made the recommendations in this report conditional on the need for a continued CIA role in estimating Soviet GNP.

What Is GNP?

Gross national product is a widely used measure of economic output that represents the total market value of final goods and services produced by a nation in a year. GNP can be calculated by

- summing expenditures on final output (e.g., consumption and investment);
- summing the value added to final output by the economy's sectors of origin, such as industry and agriculture; or
- summing incomes, such as wages, generated in producing output.

Although GNP is a useful indicator of an economy's ability to produce goods and services, it is much less useful as a measure of social welfare. Many factors—such as population, income distribution, leisure, and pollution—affect the welfare of a nation's inhabitants. Such factors may not be as readily quantifiable as GNP.

Why Is Estimating Soviet GNP Difficult?

Western efforts to estimate Soviet GNP have long been handicapped by the effects of the Soviet Union's economic system and the absence of reliable Soviet data. These handicaps include nonmarket prices that provide distorted measures of the value of goods and services, a difficult-to-measure "second economy," and statistics that impede accurate GNP estimation.

Distorted Soviet Prices

Prices in western economies are generally set by market forces and therefore reflect the resource costs of production, relative scarcities of supply, and market-determined values. In contrast, the Soviets have centrally planned and managed their economy for decades to achieve national policy objectives. Soviet prices have been established administratively with little regard to market forces. Soviet planners manipulated these "established prices" with artificially determined profits and with turnover taxes and subsidies to direct resources to various sectors. As a result, Soviet prices have not been reliable indicators of the resource costs of production.

The Second Economy

Largely because it lacks a market system to guide its choices, the Soviet economic system has been characterized by inefficiencies that result in shortages of desired goods, a wasteful use of resources on unwanted items, and the production of low-quality goods and services. Excess demand for scarce price-controlled goods has resulted in repressed inflation and an apparently large "second economy," in which private citizens provide desired goods and services at higher prices. Although such private activity generally would be legal in the West, many of these activities have been illegal in the Soviet Union. Consequently, Soviet statistics do not capture much of the second economy, and its size is difficult to gauge.

Data Limitations

Western analysts have found that Soviet economic statistics suffer from serious limitations in terms of coverage, consistency, clarity, and reliability. Some statistics that are commonly used in market economies have not been published or computed by the Soviets. For example, the Soviet Union has not historically measured its aggregate national output in terms of GNP. Instead, in accordance with Marxist concepts, the Soviets

have used net material product—a measure that excludes most services¹ and capital stock depreciation.² As a result, Soviet national income measures have omitted elements needed to estimate Soviet GNP.³

Further, Soviet statistics have been unreliable indicators of inflation and real economic growth. Soviet data on the ruble value of output are expressed in “comparable” prices that are intended to serve the same function as western constant prices—i.e., to exclude the effects of price changes. However, most western analysts—and some Soviet researchers—have concluded that Soviet comparable prices include a substantial degree of disguised, or hidden, inflation. Such inflation represents price increases without corresponding quality or productivity increases.

Western understanding of Soviet statistics has also been handicapped by the lack of detailed Soviet descriptions of the methodologies used to generate these statistics. There are many uncertainties concerning Soviet definitions and classifications, which sometimes change without notice. Soviet statistics for some activities—such as capital repair expenditures—have not reflected the same scope or coverage as U.S. statistics.

How Does the CIA Estimate Soviet GNP?

The CIA estimates Soviet GNP⁴ in several steps. First, it estimates the ruble value of GNP for a base year by both end use (e.g., consumption) and sector of origin (e.g., agriculture). The Agency initially prepares the base year estimate in Soviet established prices. It then recalculates the estimate in “adjusted factor cost” prices that, the CIA believes, better reflect the resource costs of Soviet production. After estimating base year GNP, the CIA calculates GNP for any given subsequent year by estimating the rate at which GNP has grown since the base year. An overview of the CIA’s estimating process is shown in figure 1.1.

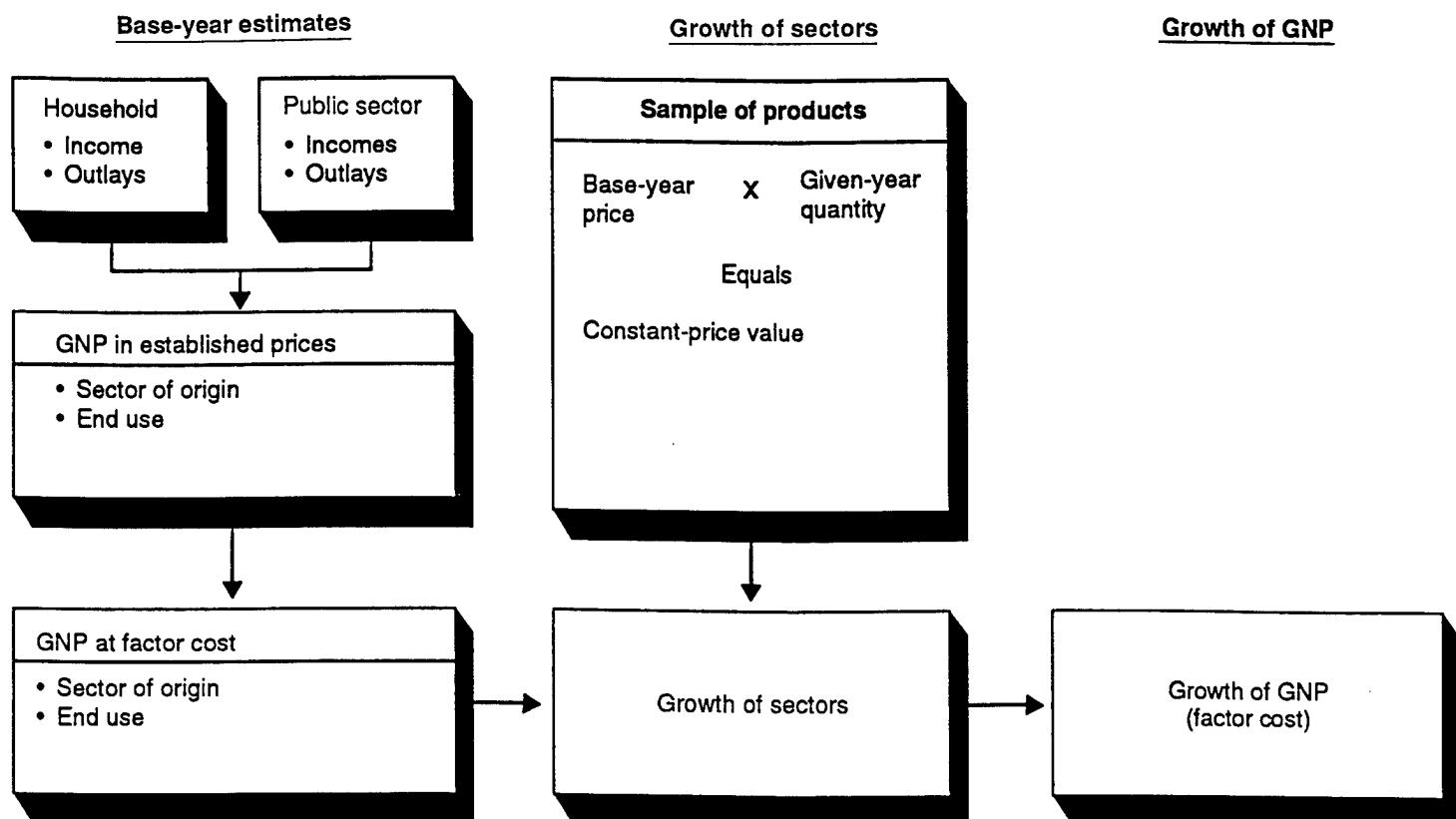
¹Services that do not directly contribute to material product—such as education and finance—are excluded from net material product in compliance with Karl Marx’s labor theory of value. In it, Marx focused on material production and excluded final services as “immaterial goods.”

²The value of a nation’s capital stock is the cumulative value of past investment after depreciation has been deducted. Investment includes fixed investment (e.g., factories, machinery, and residences) and changes in business inventories. Depreciation refers to the yearly decrease in the value of the capital stock as it is gradually consumed.

³The Soviets recently began publishing GNP figures based on net material product data but have provided only limited explanations of how these figures were developed.

⁴The CIA actually estimates Soviet gross domestic product, rather than GNP, because the CIA does not include payments for labor and capital services exchanged with other countries. According to the CIA, these items are insignificant in the case of the Soviet Union.

Figure 1.1: The CIA's Process for Estimating Soviet GNP in Rubles



Source: Derived from published CIA data.

In addition to calculating Soviet GNP in rubles, the CIA estimates the size of Soviet GNP relative to U.S. GNP. It does so by developing "purchasing power parity" conversion rates to convert the value of each nation's GNP into the other nation's currency.

The CIA's estimating process is described in more detail in the following sections.

Ruble Estimates

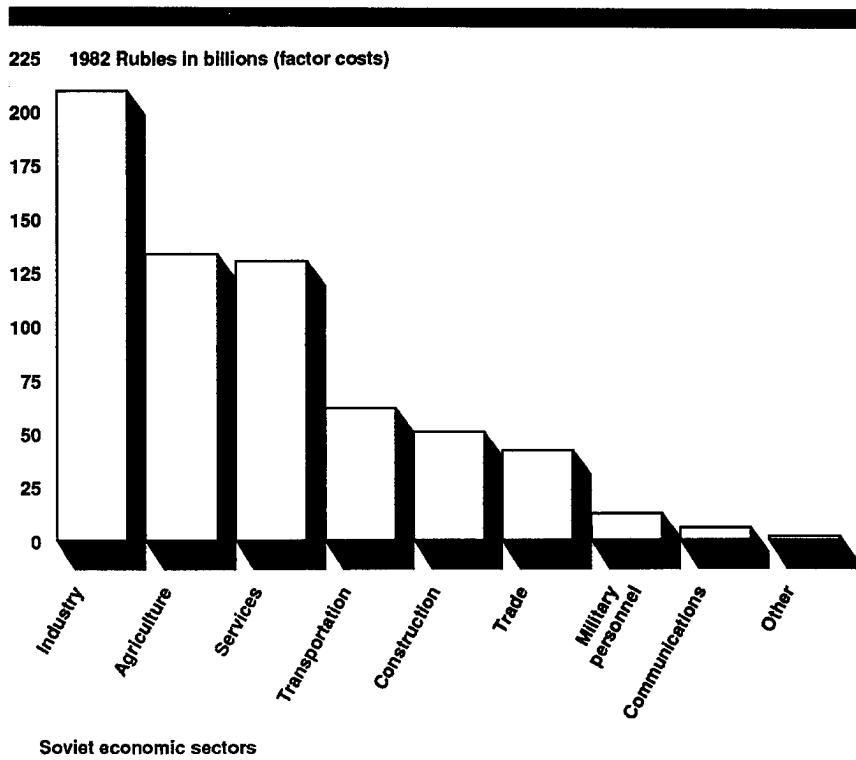
The CIA uses Soviet official published statistics, coupled with data from other Soviet publications, to calculate its base year GNP estimate (currently 1982). In essence, the CIA rearranges Soviet data into a set of four GNP national income accounts that depict incomes and outlays for the

public sector and households. Total GNP for the base year is calculated as the sum of household outlays and public sector incomes—representing the CIA's judgment that these two accounts are less affected by Soviet data problems than the others. The CIA then rearranges the four accounts to depict GNP by sector of origin and by end use.

To this point, the CIA's estimate is based on Soviet established prices, which do not accurately reflect the resource costs of Soviet production or the Soviet economy's potential to produce goods and services. The CIA therefore converts established prices into "adjusted factor cost" prices by (1) subtracting the value of indirect taxes and reported profits, (2) adding the value of subsidies, and (3) adding a return to capital—generally calculated at a uniform rate of 12 percent—for capital productivity. Figures 1.2 and 1.3 depict the CIA's sector-of-origin and end-use estimates of Soviet GNP for 1982, in adjusted factor cost prices.⁵

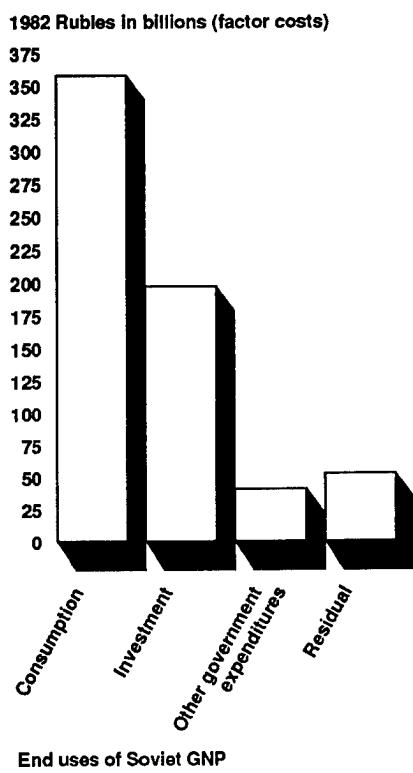
⁵The data the CIA uses to construct GNP do not include sufficient information to calculate Soviet defense expenditures, which the CIA believes are contained in the various GNP end-use categories shown in figure 1.3. The CIA uses a different and separate method to calculate Soviet defense expenditures, which we did not review.

Figure 1.2: CIA Estimate of 1982 Soviet GNP by Sector of Origin



Source: Derived from published CIA data.

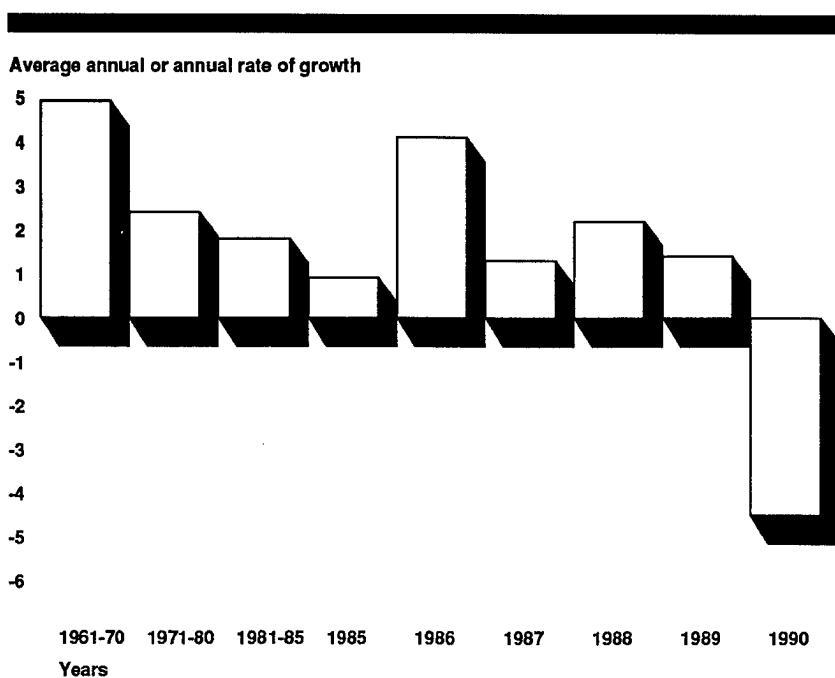
Figure 1.3: CIA Estimate of 1982 Soviet GNP by End Use



Source: Derived from published CIA data.

After estimating base year GNP in rubles, the CIA calculates the annual growth rate of Soviet GNP. To do so, it computes a weighted average of the growth rates of the economy's sectors. The CIA estimates an individual sector's growth by tracking changes in a sample of that sector's output. It uses published Soviet output data, expressed either in physical quantities (e.g., number of tons or finished items) or in terms of its ruble value. Figure 1.4 shows the CIA's estimates of Soviet GNP growth from 1961 to 1990.

Figure 1.4: CIA Estimates of Soviet GNP Growth, 1961-1990



Source: Derived from published CIA data.

The CIA also estimates (1) GNP growth by end-use components, using expenditure levels for weights, and (2) GNP growth in established prices. It does not base its calculation of total GNP growth on these estimates because it considers its sector-of-origin estimates in factor costs to be more reliable and accurate.

Comparisons of Soviet and U.S. GNP

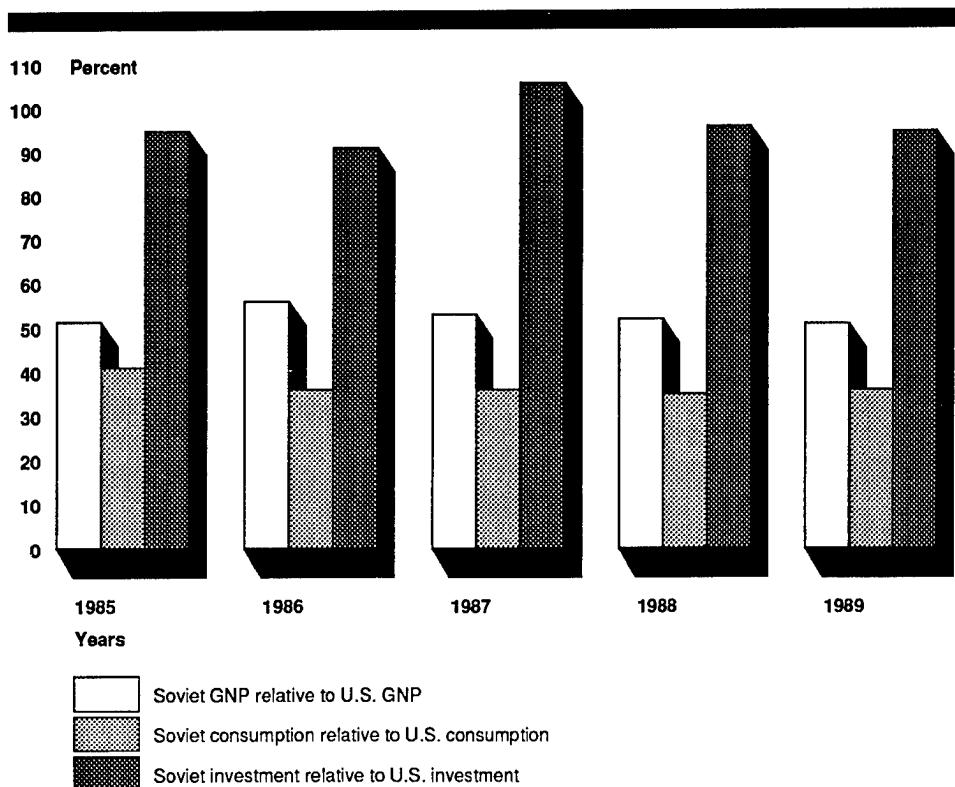
The CIA compares Soviet GNP with U.S. GNP by using purchasing power parity ratios. The ratios reflect the number of rubles needed to buy the same amount of goods and services in the Soviet Union that could be bought with a dollar in the United States, and vice versa.

The CIA calculated its ratios during the late 1970s from the 1976 prices of over 800 items found in the Soviet Union and the United States. With weights derived from Soviet expenditure levels for GNP end uses, the CIA calculated the average dollar-ruble ratios needed to convert Soviet GNP from rubles into dollars. Similarly, it employed U.S. end-use expenditures as weights in calculating the average ratios needed to convert U.S. GNP from dollars into rubles. The CIA then calculated the size of Soviet GNP relative to U.S. GNP by comparing (1) the dollar value of Soviet GNP with that of U.S. GNP and (2) the ruble value of Soviet GNP with that of

U.S. GNP. It averaged the differing results of the two comparisons by computing their geometric mean—the square root of their product.

The CIA later adjusted its aggregate purchasing power parity ratios to reflect the impact of inflation through 1982. Figure 1.5 shows the geometric means of recent CIA comparisons of Soviet and U.S. GNP and two end uses.

Figure 1.5: CIA Comparison of U.S.-Soviet GNP, Consumption, and Investment, 1985-1989 (1982 Dollars and Rubles)



Source: Derived from published CIA data.

Objectives, Scope, and Methodology

Because the CIA's Soviet GNP estimates had come under increasing criticism and some critics had suggested that the CIA had overestimated Soviet GNP, Senator Daniel Patrick Moynihan asked us to review the CIA's estimates.

The objectives of our review were to (1) assess how well the CIA has estimated Soviet GNP, both in rubles and as a percent of U.S. GNP, and (2)

identify long-term prospects for future improvements in estimates of Soviet GNP. To address the first objective, we assessed the overall reasonableness of the CIA's estimating methods. We used as our criteria general western definitions and conventions for calculating GNP, the methods used by western governments to compare GNP, and expert opinion. We reviewed available published literature concerning the CIA's estimates and estimating methods. We also attended a National Research Council conference on these methods.

We met with numerous experts on the Soviet economy, representing a broad spectrum of opinion on the CIA's estimates. We discussed Soviet GNP measurement with officials at the Departments of Defense and State, the Center for International Research of the Bureau of the Census, the Bureaus of Labor Statistics and Economic Analysis, the Council of Economic Advisers, the International Monetary Fund, and the World Bank.

We reviewed selected non-CIA estimates of Soviet GNP and critiques of CIA estimates to obtain insights into the CIA's methodological choices and identify problematic aspects of its estimates. We did not attempt to independently calculate our own estimate of Soviet GNP or assess the precise extent to which the CIA estimates might be in error. However, we conducted rough analyses to illustrate the sensitivity of the CIA's GNP estimates to changes in various assumptions.

To assess prospects for future improvements in Soviet GNP estimates, we identified the Soviets' efforts to improve their statistics, establish a market economy, and participate in international comparison efforts. We discussed the prospects for these developments with experts in the United States and with Soviet officials and academics.

The CIA refused to cooperate with our review. As a result, we were unable to meet with CIA economists to discuss their work or to review unpublished material and more detailed analyses of the Agency's Soviet GNP estimates. Despite this impediment, we believe that our review was adequate to support the conclusions and recommendations contained in this report, on the basis of our thorough examination of published CIA material, meetings with individuals familiar with the CIA's work, and our observation of the National Research Council conference where CIA analysts freely discussed their estimating methods.

Nonetheless, our lack of access to CIA materials and analysts limited our ability to pursue specific areas. For example, we were unable to conduct

detailed tests of the sensitivity of the CIA's estimates to alternate assumptions or to determine the views of CIA analysts regarding the potential impact of changes in the Soviet Union on the CIA's estimating methods.

We conducted our work from April 1990 to August 1991 in accordance with generally accepted government auditing standards.

The CIA provided written comments on a draft of this report but did not offer any specific comments on our conclusions and recommendations. The CIA's comments are included in their entirety in appendix II. We also asked several experts on the Soviet economy to review the draft report. Their comments have been incorporated in the report as appropriate.

CIA Estimating Methods Are Generally Reasonable but Are Unlikely to Result in Accurate GNP Ruble Estimates

In general, the CIA has used reasonable methods to estimate the ruble value of Soviet GNP, given the numerous difficulties that complicate the task of measuring Soviet economic performance. However, the CIA's estimates are unlikely to produce accurate results because of the inherent difficulties in estimating with very limited data the output of a complex nonmarket economy. Recent Soviet economic turmoil has increased the level of uncertainty in the CIA's estimates.

The CIA has reviewed and adjusted its estimating methods in the past. Because of problems raised by the Soviet economic crisis, the Agency recently established a task force to review its Soviet economic analyses. It has not publicly indicated which aspects of its estimates will be assessed by the task force.

CIA's Use of Generally Reasonable Methods to Estimate Ruble GNP

The CIA attempts to estimate Soviet GNP in accordance with the same concept used in the West to define GNP—the market value of goods and services sold to final purchasers in a given year. The CIA's conceptual framework for deriving and presenting Soviet GNP—calculating base year totals by summing income and outlay accounts and using these accounts as the basis for estimating GNP by sector of origin and end use, respectively—is consistent with recognized western methods for calculating GNP.¹

The CIA's method of arranging Soviet data into four income and outlay accounts (see fig. 1.1) is based on methods devised by academic researchers in the 1950s. In constructing the accounts, the CIA has tried to accommodate the differences between western free-market economies and the Soviet state-planned economy. For example, the CIA categorizes Soviet government expenditures on health and education as consumption rather than public sector expenditures to allow better comparability with U.S. estimates.

When the CIA cannot apply normal western methods due to Soviet conditions, such as the lack of market prices, it has chosen generally defensible alternate approaches. These alternate approaches include the CIA's methods for adjusting Soviet prices and calculating GNP growth.

¹The choice of method is generally dependent on the quality and availability of data. For example, according to a Bureau of Economic Analysis official, the United States relies primarily on the end-use method to calculate the total value of U.S. GNP.

The CIA adjusts Soviet established prices because they cannot be used to measure the market value of goods and services—the definition of GNP as applied in the West. The CIA adjusts Soviet prices by removing indirect taxes, adding subsidies, and replacing reported profits with an assumed rate of return on capital. Removing direct taxes and subsidies generally conforms to western standards and practices.² Experts generally agree that taxes and subsidies should be removed. By doing so, the CIA improves its basis for measuring changes in the Soviet economy's production potential by providing a better depiction of the resource costs of production and the end-use allocation of resources. However, there is less consensus about the CIA's use of an assumed rate of return to capital.³

The CIA does not use the standard western approach for calculating growth because it lacks reliable Soviet data. As used in the United States, the western practice relies on relatively accurate indexes of prices over time. These indexes are used to remove the effects of price inflation from the dollar value of a given year's GNP. By doing so, the deflated dollar value of GNP can be compared with the similarly deflated dollar value of a previous year—allowing real GNP growth to be calculated.

The CIA, however, does not use this method to calculate growth because it has concluded that Soviet price indexes are not free of hidden inflation. Because these indexes therefore cannot be used to deflate Soviet ruble value data, the CIA instead relies primarily on data expressed in physical quantities to construct growth indexes. Experts generally agree that Soviet ruble value data contain hidden inflation and therefore do not provide an accurate basis for measuring real growth.

²In the West, GNP accounts are sometimes used to calculate national income valued at factor cost (i.e., market prices excluding taxes and subsidies), although market prices are generally viewed as insignificantly distorted by such taxes and subsidies.

³Substituting an assumed capital return rate for profits is not a standard western practice. Some experts believe that the CIA's method is conceptually questionable, too dependent on weak capital stock data, and likely to distort growth rate estimates by giving too much weight to certain sectors. The CIA argues that while it has little theoretical justification for its assumed rate, other rates would have little effect on its results, and Soviet profit data are too flawed to use.

Impact of Estimating Difficulties on Accuracy of GNP Estimates

The CIA's estimating methods, however defensible, are unlikely to produce accurate results. Our review indicates that the number and scope of uncertainties that are inherent in estimating Soviet GNP—including problems in using either quantity or value data and assessing the size of the second economy—assure that any precise estimate will be subject to some degree of error. The CIA has concluded that its ruble value GNP estimates may be overstated by as much as 5 percent and its estimates of average annual GNP growth may be slightly understated.

One difficulty concerns the quantity data used by the CIA in measuring growth. Because these data do not fully capture quality improvements or changes in the mix of products over time, CIA estimates could understate Soviet growth if Soviet quality is gradually improving. Conversely, if Soviet quality is actually deteriorating—as some critics argue—CIA estimates could tend to overstate Soviet growth.

Moreover, the CIA's use of quantity data assumes that these data are generally accurate. Although western experts have generally concluded that Soviet quantity data are more reliable than value data, their confidence in this conclusion has been undermined over the last year, and they have called for new studies of the validity of quantity data. Some experts are concerned that the Soviet system encourages Soviet enterprises to overreport production. If the incidence of overreporting has increased over time, the CIA's growth rate estimates could be overly high. Conversely, CIA and Soviet officials now suggest that recent Soviet tax reforms and the increased use of barter may encourage Soviet enterprises to underreport production. If so, then growth estimates based on quantity data could be too low.

Because adequate Soviet quantity data are not always available to the CIA, 10 percent of the data that it uses to calculate GNP growth are value data. Use of value data can lead to overestimated growth rates because of difficulties in accurately deflating the data. CIA reliance on value data is greatest in the industrial sector, particularly in its machine-building branch, where almost 40 percent of the sample data in the base year was value data. The CIA has publicly noted that its estimate for this sector is the most affected by data problems.⁴

⁴USSR: Measures of Economic Growth and Development, 1950-1980, prepared for the Joint Economic Committee, Congress of the United States, Part II, (Washington, D.C.: U.S. Government Printing Office, Dec. 8, 1982), pp. 212 and 215.

A further source of uncertainty in the CIA's estimates is the second economy, for which there are few reliable data. The CIA has stated that its base year estimate of Soviet GNP captures as much of the legal private production in agriculture and housing as the Agency can identify but misses most illegal production of consumer goods.⁵ The CIA estimates that the second economy accounted for about 6 percent of Soviet GNP in 1982, but has stated that this figure may be too low. Some non-CIA experts believe that the second economy may be far larger. One leading expert has indicated that it may have accounted for up to 25 percent of Soviet GNP in 1988. The CIA also indicated that it had difficulty measuring second economy growth, which some experts believe has increased rapidly in recent years.

Conversely, the widely recognized inefficiency of the Soviet economy may result in overstated CIA estimates of Soviet growth. Ideally, estimates of GNP growth should represent changes in the value added by the economy's sectors, rather than changes in their gross output. Gross output includes intermediate products as well as value added. Because of limited Soviet data, the CIA uses gross output as a proxy for value added in estimating growth in the Soviet industrial, transportation, and trade sectors. It similarly uses data on intermediate products and labor inputs as proxies in the construction and service sectors, respectively.

These practices are defensible and should not distort the CIA's results if the relationship between the proxies and the value added does not change over time. However, if the Soviet economy becomes increasingly wasteful or inefficient in using intermediate products to produce final output, the CIA's use of intermediate production data in its proxies for value added could result in overstated growth estimates.

Other factors also affect the degree of uncertainty in the CIA's estimates. The base year weights may be affected by the lack of an assumed rate of return on land—i.e., rent—in the CIA's estimates. The CIA has found that capturing rents is difficult because Soviet prices do not include specific rent charges. Similarly, the CIA's capital stock estimate is weakened by the paucity of data on capital depreciation and capital stock prices. The CIA accepts official Soviet data on enterprise depreciation payments, although it recognizes that they may be too low and does not adjust capital stock prices to factor cost.

⁵Measures of Soviet Gross National Product in 1982 Prices, a study prepared by the Central Intelligence Agency for the Joint Economic Committee, Congress of the United States (Washington D.C.: U.S. Government Printing Office, Nov. 1990), pp. 17-18.

Another source of uncertainty is the pace of economic change in the Soviet Union. If it leads to changes in the relative size of the economy's sectors, the weights derived from the 1982 base year will be outdated—reducing the accuracy of the CIA's growth estimates.

We were not able to calculate the impact that these and other uncertainties may have on CIA estimates of GNP in rubles because we did not have access to the detailed data necessary to make such calculations. The CIA has concluded that it may have overstated its estimates of the ruble value of Soviet GNP by as much as 5 percent and understated its average annual GNP growth rate estimates from 1951 to 1987 by up to 0.3 percentage points. Its published conclusions are summarized further in appendix I.

CIA Efforts to Improve Its Estimates

The CIA testified in mid-1991 that the Soviet economic situation has increased the level of uncertainty in its estimates. The Agency has initiated a major review of its Soviet economic analyses, and outside experts have identified areas needing further review.

Need for Review of Estimating Methods and Data Problems

The Soviet economy began to deteriorate appreciably after the mid-1980s as reforms crippled the central planning system without creating a market economy to succeed it. By 1989 Soviet consumer markets virtually collapsed as supplies in state stores dwindled, leaving Soviet consumers to resort to barter and the second economy. Western and Soviet sources indicate that in 1990 output fell and inflation rose. The CIA has testified that Soviet transportation and distribution networks broke down.

According to the CIA, these rapid changes in the Soviet economy have increased the uncertainty in the Agency's GNP estimates and reduced their usefulness. Earlier this year the CIA evidently concluded that for the first time its long-standing method for estimating Soviet growth had produced results that it did not consider credible. After finding that its estimate of Soviet growth in 1990 was very similar to the official Soviet estimate, the CIA made an ad hoc adjustment to its estimate—cutting it from about minus 2 percent to minus 4 or 5 percent. It reasoned that its original estimate was too high because the breakdown in Soviet transportation and distribution had undermined the CIA's assumption that gross output is a useful proxy for value added in estimating growth. In effect, the Soviet economy became less efficient because intermediate

production was not always available when needed as an input in producing final output. The CIA also speculated that accelerating Soviet inflation had magnified the inflationary impact of the value data the CIA used.

Areas Requiring Review

The CIA has publicly acknowledged that several aspects of its Soviet GNP estimating process need review and that it is focusing on improving its estimates of growth in key GNP components by (1) updating its sample of machinery and other industrial products, (2) trying to broaden and disaggregate its sample of products, (3) evaluating research on the impact of hidden inflation on growth in machinery investment and output, and (4) developing better estimates of the impact of foreign trade on growth. The CIA has also stated that it is studying potential methods of incorporating productivity gains in services and will introduce new indexes to correct its past failure to reflect quality increases in housing, education, and health services.

The CIA is also interested in calculating several base years instead of one. By doing so, it could improve its estimate of GNP growth in a given year by using the prices of that year or a year close to it. The CIA further plans to incorporate a return-to-land factor in its estimates, although it has concluded that doing so will not have a large impact on the overall estimate. Lastly, the CIA continues to review outside research on the size of the second economy.

More recently, the CIA testified that it had established an internal task force to review its analyses of the Soviet economy in light of Soviet economic developments. The Agency did not indicate the specific issues that the task force would address or the task force's expected completion date.

Outside researchers have also suggested various areas that could usefully be studied by the CIA in order to improve its estimates. A November 1990 conference of Soviet economic experts sponsored by the National Research Council discussed several issues that might merit further research, including

- annually recalculating GNP in current prices, instead of periodically calculating a single base year;
- changing the current method of adjusting Soviet prices to reflect returns to Soviet capital investment;
- reassessing the continued reliability of quantity data; and

-
- reviewing the possibility of using previously unavailable Soviet data to alleviate western concerns over Soviet value and quantity data.

Conclusions

The CIA has used generally reasonable methodologies to attempt the difficult task of estimating the GNP of a nonmarket economy that did not publish its own GNP estimates. Because of the lack of consistently reliable and well-understood data on the Soviet economy, the CIA's methods for estimating the ruble value of Soviet GNP have reflected a considerable degree of judgment. As a result, these methods are unlikely to produce accurate estimates of Soviet GNP in rubles. Moreover, in the short term, their accuracy may deteriorate as Soviet economic changes affect their underlying assumptions.

The CIA's decision to review its estimates offers the prospect that the Agency will eventually be able to improve its estimates should circumstances in the Soviet Union warrant continued GNP calculations. However, because the CIA refused to cooperate with our review, we do not know if the CIA task force intends to address the specific issues that need further analysis if the Agency is to improve its estimates.

Recommendation

We recommend that, if the CIA continues its GNP estimating work, the Director of the CIA direct the CIA task force to address the key research issues affecting the Agency's Soviet GNP estimates, to the extent that it has not already planned to do so.

CIA Comparison Estimates Probably Overstate the Relative Size of the Soviet Economy

The CIA's weakest estimate is its comparison of Soviet and U.S. GNP. This weakness is due primarily to the difficulties that are inherent in the method used to compare the two economies and to the CIA's failure to update its purchasing power parity ratios since the 1970s. As a result, the CIA has probably overstated the relative size of the Soviet economy, although the overstatement could be offset by errors in the ruble estimate. These problems suggest that use of a single figure to depict the relative size of Soviet GNP lends the estimate an unjustified air of precision. Moreover, the estimate represents the average of two individual ruble and dollar value comparisons that are separated by a gap of 27 percentage points—a further illustration of the difficulty in comparing nations with very different economic structures.

Non-CIA comparisons also suggest that Soviet GNP has been less than that estimated by the CIA. However, it is difficult to fairly compare these estimates with those of the CIA because they are either based on a different methodology or involve subjective adjustments for factors related to welfare considerations.

Advantages and Limitations of Comparison Methodology

Reasonable Comparison Methodology

The CIA chose the "purchasing power parity" method to address the difficult problem of expressing the value of one nation's GNP in a currency other than its own. Analysts using this method compare the prices of similar commodities in different countries and use the resulting price ratios to calculate the rate at which one currency should be converted into another to purchase an equivalent set of goods and services in the different countries.

The CIA's choice of the purchasing power parity method has allowed it to benefit from the experience of the 80-nation International Comparison Program (ICP). The ICP has conducted purchasing power parity comparisons since 1968 with the support of agencies such as the United Nations, the World Bank, and the European Economic Community. Recently the Soviet Union began participating in the ICP, and the initial results of an

ICP-sponsored comparison between Austria and the Soviet Union were projected to be available by 1992 or 1993.

The purchasing power parity method offers several conceptual advantages over the use of currency exchange rates in comparing the GNPs of different nations. Purchasing power parities can be used to value the GNPs of countries—such as the Soviet Union—with inconvertible currencies and multiple, government-established exchange rates. Properly constructed parities reflect all goods and services relevant to GNP, while exchange rates are largely determined by international capital transactions and by the international trade of goods and services. Moreover, purchasing power parity-based comparisons are not directly affected by sudden changes in currency exchange rates that can result from factors that are largely unrelated to GNP.

Furthermore, parity-based comparisons better reflect the domestic purchasing power of currencies and therefore the real value of each nation's GNP. In comparing wealthier and poorer nations, the ICP has found that currency exchange rates generally undervalue the domestic purchasing power of the poorer nations' currencies. As a result, a poorer nation's GNP will appear larger in a purchasing power parity-based comparison with a wealthier nation than in an exchange rate-based comparison.

Weaknesses in the Comparison Method and Its Application to the Soviet Union

Although the purchasing power parity method has several advantages, it also has some limitations. Analysts using the purchasing power parity method need to collect and weigh extensive amounts of comparable price data for goods and services of equal quality and of equal representative importance in each country being compared.

These conditions are particularly difficult to meet in comparisons involving nations at different levels of development or with fundamentally different economic systems. Centrally planned economies and economies at relatively lower levels of development may not produce the wider variety and higher quality of items produced in market economies and more highly developed nations. As a result, centrally planned economies and lesser developed economies may appear larger than they actually are when compared with market economies and more highly developed economies.

Moreover, a purchasing power parity-based comparison does not result in a single valid result. A comparison of two GNPs valued in one nation's

currency will produce a different result than a comparison of the same GNPs valued in the other nation's currency. The gap between the two distinct but theoretically equally valid results reflects the differences in the price and output structures of the nations being compared.¹ To summarize these different results into a convenient single figure, analysts may use the convention of calculating the geometric mean of the results. However, this single figure is no more valid than the individual results in the different currencies.

These limitations of the purchasing power parity method are evident in the CIA's U.S.-Soviet comparisons. The CIA had difficulties collecting and weighing comparable price data for Soviet and U.S. items of equal quality and representative importance. The CIA compiled price data for roughly the same number of items as the ICP, but it had to use available established price data of varying quality and comprehensiveness—adding to the uncertainty of its results. In some cases the CIA relied on fragmentary data, such as a single statement in a Soviet publication.

Soviet goods and services are generally recognized as inferior in quality to their U.S. counterparts, and the CIA had difficulty ensuring that its purchasing power parities were based on items of comparable quality. The CIA adjusted its parities to compensate for unavoidable quality differences by discounting the prices of numerous U.S. items, based on expert assessments of the ability of Soviet goods to function as intended. However, according to the author of the CIA's consumption comparison, the Agency may not have made sufficient allowances for inferior Soviet foods and services. Moreover, by using ICP conventions on health services, the CIA's consumption comparison did not reflect the much higher training level of U.S. medical personnel.

The CIA was also unable to devise a sample that fairly represented the mix of goods and services consumed in the Soviet Union and the United States. According to the CIA, many items that are readily available in the United States are not produced in significant quantities in the Soviet Union. In many cases the CIA resorted to matching U.S. goods with

¹For example, U.S. GNP appears larger in relation to Soviet GNP when the comparison is conducted in rubles. Because relative prices and relative quantities are generally inversely related, items produced in relatively large quantities in the United States and small quantities in the Soviet Union—such as cars—will have relatively high ruble prices and low dollar prices. Accordingly, the relatively high ruble price of Soviet cars and large volume of U.S. car production will raise the ruble value of U.S. GNP. The reverse occurs when the comparison is made in dollars.

smaller and less advanced Soviet models that did not reflect U.S. advantages in style, design, color, and attractiveness. As a result, the CIA's consumption sample was more representative of the goods and services produced by the Soviets than it was of the wide range of U.S. goods. It placed less emphasis on more advanced items where the relative disparity in U.S. and Soviet prices would most favor the United States.

The effect of the sample's overemphasis on Soviet goods may be exacerbated by continued CIA use of aging purchasing power parities for individual products and services. These detailed ratios were originally developed for 1976² and the data that they incorporate are now 15 to 24 years old.³ Although the CIA has updated the aggregate parities to reflect inflation through 1982, its continued use of the old detailed parities suggests that its consumption sample may be increasingly less representative of the U.S. mix than before—particularly if the current U.S. mix of consumer items includes an increased percentage of high technology goods that cannot easily be matched with Soviet items.

Concern over the age of the parities led to suggestions at the National Research Council's 1990 conference of Soviet experts that the CIA calculate new purchasing power parities. The CIA has not indicated that it plans to do so.

The purchasing power parity methodology's limitations in comparing economies as disparate as the U.S. and Soviet economies are also evident in the consistently large gap between the CIA's dollar and ruble value estimates. The CIA's most recent ruble value comparison⁴ indicated that Soviet GNP was 39 percent that of the United States, while the dollar value comparison indicated that Soviet GNP was 66 percent of U.S. GNP—a gap of 27 percentage points. The CIA uses the geometric mean of the dollar and ruble results to bridge this gap and to provide a single number.

Lastly, the accuracy of the CIA's comparisons depends not only on its dollar-ruble conversion rates but also on its estimates of the ruble value of Soviet GNP. Accordingly, the uncertainties that affect the CIA's ruble

²ICP price data are re-collected at intervals of 5 years or less. For example, the ICP's U.S. price data are continuously updated on a 3-year cycle by the U.S. Bureau of Labor Statistics.

³To estimate Soviet investment prices for 1976, the CIA adjusted previously published data on 1967 and 1970 prices for Soviet machinery, equipment, and construction.

⁴The CIA's most recent published comparison compares U.S. and Soviet GNP for 1989. It has yet to publish a comparison of U.S. and Soviet GNP for 1990.

estimates also weaken its comparisons. The CIA has noted that its comparison work is hampered by the fact that its Soviet GNP accounts lack the precision found in western GNP accounts. Moreover, the degree to which its estimates overstate the ruble value of official Soviet GNP or undervalue the second economy will affect the ultimate outcome of the comparison efforts.

Impact on CIA Results

We conducted several rough sensitivity analyses to illustrate the potential impact that changes in the ruble estimate of Soviet GNP and the purchasing power parity might have on the comparisons.⁵ We found that the comparison was relatively insensitive to changes in assumptions affecting the ruble value of Soviet GNP but relatively sensitive to changes in the purchasing power parity.

We found that a 10-percent increase in the ruble value due to a larger estimate of the second economy would raise the geometric mean of the CIA's estimate of Soviet GNP as a percentage of U.S. GNP from 51 to 56 percent. We also found that when we assumed a 1-percent increase in the annual hidden inflation rate in the Soviet industrial sector since 1982, relative Soviet GNP fell from 51 to 50 percent of U.S. GNP. When we assumed that an additional 50 percent of Soviet agricultural output was wasted, relative Soviet GNP fell from 51 to 46 percent of U.S. GNP.

We also conducted some rough analyses of the sensitivity of the CIA's comparison to changes in the purchasing power parity and found that the comparison was relatively sensitive to such changes. The CIA has stated that its comparisons probably overstate the value of Soviet GNP because of difficulties in adjusting for the inferior quality and limited variety of Soviet goods and services. In 1990 the Agency testified that it may have overestimated the ruble's purchasing power relative to the dollar by as much as 10 percent. We calculated that a 10-percent overestimation in the purchasing power of the ruble would reduce the geometric mean of the CIA's current estimate of Soviet GNP as a percentage of U.S. GNP from 51 to 46 percent.⁶ We also found that 20- and 50-percent overstatements of the ruble's purchasing power in dollars would

⁵The results of our sensitivity analyses—including their impact on the individual ruble and dollar comparisons and on the geometric mean—are more fully described in appendix I.

⁶If the CIA has also overestimated the ruble value of Soviet GNP by 5 percent—as it has publicly suggested—its estimate of Soviet GNP as a percentage of U.S. GNP would fall to about 44 percent. However, the effect of overestimating the ruble's purchasing power could be offset if the CIA has underestimated the ruble value of Soviet GNP by failing to include all relevant second economy activities.

reduce the CIA's estimate to 42 and 34 percent, respectively. The CIA has testified before the Senate Foreign Relations Committee in July 1990 that 35 percent might be a conceivable lower boundary for the ratio of Soviet to U.S. GNP.

Non-CIA Comparisons

Other comparisons of the U.S. and Soviet economies have generally yielded lower results than those of the CIA. Some of these estimates are based on adjustments made to the CIA's comparisons. For example, a detailed outside review of the CIA's estimate of Soviet per capita consumption for 1976 reduced the estimate from 34.5 percent of U.S. per capita consumption to 22.5 percent.⁷ The reduction resulted primarily from calculations of the impact of the relatively low quality of Soviet retail services and from subjective adjustments for additional deficiencies in Soviet quality. The review concluded that Soviet GNP was probably no more than 30 percent of U.S. GNP. Other, less detailed efforts to adjust the CIA's estimates for similar factors have also concluded that Soviet GNP is roughly one-third of U.S. GNP.

Although these factors⁸ are significant indicators of the quality of Soviet life, they are generally viewed as measures of relative welfare rather than measures of GNP. The CIA has stated that its comparisons do not directly measure relative welfare and that these factors are unquantifiable. The subjectiveness of the adjustments that have been made to reflect these factors raises questions as to their defensibility and likely accuracy. Moreover, a recent effort by an outside expert to quantify the quality differences between U.S. and Soviet trade services indicated that the impact on the comparison would be slight.

Other non-CIA comparisons have used Soviet exchange rates to convert Soviet GNP from rubles to dollars. These comparisons have produced far lower results than the CIA's estimates. One such comparison concluded that Soviet GNP was as little as 14 percent of U.S. GNP,⁹ based on a rate of 77 cents per ruble. Another estimate, based on a rate of 56 cents per

⁷Igor Birman, Personal Consumption in the USSR and the USA (New York: St. Martin's Press, 1989), p. 155.

⁸CIA publications list these factors as the deficient style, attractiveness, and taste of consumer items; the low quality of retail services; inferior distribution and service facilities; the degree to which consumers are unsatisfied by goods; and the lack of supposedly available goods.

⁹Victor Belkin, "Market and Non-Market Systems: Limits to Macroeconomic Comparability," (A paper presented at the American Enterprise Institute Conference on Comparing the Soviet and American Economies, April 19-22, 1990).

ruble, concluded that Soviet per capita GNP in 1989 was \$1,780¹⁰ — which would indicate that Soviet GNP was less than 10 percent of U.S. GNP.

The accuracy of these comparisons rests largely on the validity of the exchange rate selected to convert Soviet GNP. Because the ruble has not been freely convertible, Soviet exchange rates have been set by the Soviet government and not by the international supply of and demand for rubles. The multiple exchange rates established by the Soviets for different purposes ascribe varying degrees of value to the ruble.¹¹

Moreover, exchange rate comparisons may be inherently more likely to produce lower results in U.S.-Soviet comparisons than purchasing power parity comparisons. ICP findings regarding other nations suggest that Soviet exchange rates could undervalue the domestic purchasing power of the ruble by as much as 50 percent.

Conclusions

The task of comparing two very different economies is inherently difficult. The CIA has probably overestimated the relative size of Soviet GNP as compared with U.S. GNP, although any failure to capture a significant portion of the second economy in its estimates could offset the amount of overestimation. The likelihood that its estimate is accurate is diminished by the considerable difficulties that the CIA faced in assembling its purchasing power parities and in developing its ruble estimates. Accordingly, using a single figure to depict the relative size of Soviet GNP lends an unjustified air of precision to its results.

The CIA has added to the possible error in its comparisons by not recalculating its detailed purchasing power parities for individual products and services since the late 1970s. That failure is significant given the sensitivity of the comparison estimate to changes in the parities. However, the level of inflation and economic turmoil in the Soviet Union may complicate near-term efforts by the CIA to gather current price data and develop new purchasing power parities. Moreover, the Soviet Union's

¹⁰The Economy of the USSR: Summary and Recommendations, International Monetary Fund, International Bank for Reconstruction and Development, Organization for Economic Cooperation and Development, and European Bank for Reconstruction and Development (Washington, D.C.: 1990), p. 51.

¹¹By late 1990 Soviet exchange rates included an official rate of \$1.66 per ruble, a commercial rate of 60 cents per ruble, and a tourist rate of 17 cents per ruble. A later revaluation reduced the tourist rate to 3.6 cents per ruble. Use of this rate would indicate that Soviet GNP was less than 1 percent of U.S. GNP.

recent decision to become an active participant in the International Comparison Program raises questions as to the need for the CIA to continue its efforts to replicate the ICP's methodology. Lastly, the current dramatic reforms going on in the Soviet Union could also affect the continued need for the CIA to independently compare U.S. and Soviet GNP.

Recommendations

If conditions in the Soviet Union necessitate that the CIA continue to estimate Soviet GNP, we recommend that the Director of the CIA

- present the CIA's comparison estimate as a range rather than a single point estimate and explain the criteria and methodology used to calculate the range and
- collect Soviet price data to recalculate purchasing power ratios as soon as Soviet economic conditions allow—unless the CIA chooses to adopt the results of other comparison efforts, such as the ongoing United Nations-sponsored international comparison of Soviet GNP.

Changes in the Soviet Union Could Eventually Facilitate Better Estimates of Soviet GNP

Although the economic crisis in the Soviet Union may complicate efforts to estimate Soviet GNP in the short term, Soviet interest in economic and statistical reforms suggests that the challenge of accurately estimating Soviet GNP may eventually be reduced, or the need for such estimates ultimately eliminated. This interest in reform appears to have accelerated sharply in the wake of the failed coup attempt by conservative forces in late August 1991. If the Soviet Union, or any confederation of republics that replaces it, eventually succeeds in shifting to a market economy, reforms its economic statistics, and continues to participate in the ICP, western efforts to measure Soviet GNP may no longer be needed. Nonetheless, it is likely that years of effort will be required before Soviet data meet western standards of reliability and accessibility.

Soviet Economic Reform

A Soviet transition to a market economy would greatly ease the task of estimating and assessing Soviet GNP. Such a move would mean replacing distorted state-established prices with market prices. A market economy could also reduce the inefficiency of a centrally planned system that has adversely affected the Soviet Union's output of goods and services.

The Soviet Union has endorsed the idea of abandoning its planned economy for a market economy. However, the current dramatic movement toward political and economic reform makes it very difficult to predict either the speed or success of such efforts.

In the fall of 1990, faced with an increasingly serious economic crisis, the Soviet government rejected a 500-day plan for transition to a market economy. Instead, it chose a more limited set of guidelines. Rather than introducing free market prices according to a defined time schedule, the guidelines outlined a general sequence of phases. The first phase focused on stabilizing the Soviets' financial situation, preventing economic disruptions, and introducing structural reforms—including recognizing private property rights. Only in the second stage would government price controls have been gradually liberalized, while many wholesale prices would remain under government control. Full implementation of market prices remained in the future.

Following the failure of the August 1991 conservative coup, the Soviet President endorsed a rapid transition to a market economy. However, as of late August 1991, a plan for doing so had not yet been adopted.

Statistical Reforms

Soviet adoption of western statistical standards and accounting systems would greatly facilitate measurement of Soviet GNP. Although the Soviet government had taken some important first steps toward implementing international statistical standards, much more would be needed to achieve these standards.

Among the steps the Soviets had taken prior to August 1991 was to elevate the status of their central statistical administration to that of a full state committee—the State Committee of the Union of Soviet Socialist Republics for Statistics (Goskomstat). They had also become more candid about the limitations of their existing statistics. Goskomstat officials acknowledged that Soviet statistics have not met international standards and that many western criticisms of Soviet statistics were valid. For example, Goskomstat officials informed us that hidden inflation continued to be a problem in ruble value data, particularly with respect to the machinery sector. Goskomstat also acknowledged the Soviet statistical administration's past reputation for distorting statistics and for presenting the Soviet economy in the best possible light. In mid-1991 Goskomstat officials stated that Soviet statistical policy was aimed at (1) supporting the transition from a central command form of economic management to a free market system and (2) narrowing gaps in the Soviet Union's knowledge of international statistical practices.

Moreover, the Soviets were moving to address their most serious statistical problems. The Soviet Union had decided to create a new system of GNP national accounts, based on United Nations standards. Goskomstat officials informed us that the creation of these accounts was their top priority and that they would experiment with a set of GNP national accounts during 1991, with assistance from western experts. They were planning to calculate major economic indicators by 1993 and to attempt a more complete conversion to GNP accounts between 1996 and 1999. Goskomstat had also begun to gather more accurate data on consumer price increases.

In addition, the Soviets had made official Soviet data more available. Goskomstat had produced new types of economic statistics, such as the first Soviet calculations of Soviet GNP, and had released extensive amounts of previously unavailable data to western international economic agencies. It had also begun publishing a broader variety of data in its statistical handbooks.

Soviet statistical authorities had been actively seeking the advice of developed countries, specifically regarding technical assistance in

bringing statistical methods up to western standards. Goskomstat officials had maintained technical exchanges with the Organization for Economic Cooperation and Development, the Statistical Office of the European Communities, and the U.S. Census Bureau to expand and improve the quality of Soviet economic statistics. Goskomstat had also made a concerted effort to participate in international statistical conferences.

Despite these positive developments, U.S. government officials believe that the Soviets would need to do much more to implement statistical reforms. According to western experts and government officials, the Soviets have yet to achieve substantive improvements in their statistical system and face years of effort before they do so. Goskomstat officials confirmed to us that considerable time and effort would be needed to develop Soviet statistics that meet international standards.

For example, the Soviet Union's current GNP figures are based on its modifications to net material product data. Western experts anticipate that problems with these data will transfer to Soviet GNP statistics. Although the Soviet decision to convert to the United Nations system of GNP national accounts would address this problem, substantial time would be required to convert the Soviet statistical system to the international standard and to develop expertise in the collection and processing of western-style economic data.

Other challenges facing Goskomstat include

- making public a comprehensive description of its statistical methodology;
- developing fully adequate price indexes and resolving the problem of hidden inflation;
- overcoming the reluctance of a growing number of private enterprises to provide Goskomstat with statistical data, due to continued wariness concerning its former role in monitoring compliance with government economic plans; and
- developing new methods to measure the amount of capital stock, the rate of return to capital, the amount of "nonproductive" services, and the second economy.

results of the Soviet-Austrian comparison, which were projected to be available by 1992 or 1993, would allow the Soviet economy to be compared with the economies of other ICP participants.

Goskomstat has also been involved in a separate, bilateral comparison with Germany. The Soviet-German comparison, which is to be based on purchasing power parities, was scheduled to be completed this year. Due to the lack of market prices in the Soviet Union, certain sectors, such as consumer services, are to be measured using quantity data.

Goskomstat officials informed us that they were very interested in conducting a bilateral U.S.-Soviet comparison. This comparison would be independent of the Soviet Union's comparison work with the ICP and Germany. According to U.S. government officials, the United States has declined to become involved in such a project, due to concerns regarding the lack of Soviet market prices and reliable Soviet constant price data.

Implications of Soviet Reform for Western Estimates of Soviet GNP

Existing western methods of estimating Soviet GNP have been shaped largely by the lack of readily usable and reliable Soviet GNP data measured in market prices. These methods may become unnecessary if the Soviet Union, or any confederation of republics that succeeds it, makes a successful transition to a market economy, reforms its economic statistics, and continues to participate in the International Comparison Program.

However, given the momentous changes now going on, it is difficult to predict when, or if, these conditions are likely to be met. To the extent that they are, the need for an independent U.S. estimate could diminish and at some point disappear. Other sources of information—including Soviet and international agencies—could eventually supplant the CIA as the primary source of Soviet GNP data. Until that point, incremental improvements in western estimates of Soviet GNP are possible if the Soviets continue to release previously unavailable data and improve the quality of their data. Although improvements in the quantity and quality of such data may raise new questions about previous assumptions, western understanding of the size and nature of the Soviet economy would be greatly enhanced.

Sensitivity Analyses of Soviet GNP Estimates

Sensitivity analyses are often used to assess the likely effects of changes in assumptions on quantitative results. The Central Intelligence Agency (CIA) has conducted several such analyses to test the impact that various alternate assumptions—including those proposed by outside analysts—would have on its estimates of Soviet gross national product (GNP) growth. It found that these alternate assumptions would, if valid, have only a slight effect on the estimates.

We conducted some rough sensitivity analyses on the CIA's comparison of U.S. and Soviet GNP. We found that the comparison was relatively insensitive to changes in assumptions affecting the ruble value of Soviet GNP but relatively sensitive to changes in the purchasing power parity.

CIA Sensitivity Analyses

The CIA's sensitivity analyses of its growth rate estimates over the past several years include tests of the possible effects of

- changing the base year used,
- assuming different rates of return to capital in adjusting Soviet prices to reflect factor costs,
- using machinery output data expressed in physical quantities instead of data expressed in comparable ruble prices,
- considering biases arising from using quantity or value data,
- including a rate of return to land for the distribution of GNP by sector of origin,
- underestimating the degree of waste in the agricultural sector, and
- incorporating housing quality improvements and labor productivity gains in the health and education sectors.

The CIA concluded that each of these assumptions would alter the growth rates of certain sectors but would not greatly affect overall Soviet GNP growth.¹ For example, the CIA concluded that the net effect of the biases introduced by its use of value and quantity data in estimating growth was very slight. The CIA uses value data to estimate growth in some parts of the Soviet economy. Because Soviet value data include hidden inflation, their use results in a bias toward an overstated growth estimate. Conversely, the physical data used by the CIA to estimate growth in other parts of the economy tend to underestimate growth. The CIA

¹The CIA did not test these assumptions simultaneously. The results were developed in several different studies that it conducted over a period of several years.

found that these opposing biases tended to offset one another and concluded that it might have underestimated average annual GNP growth by up to 0.3 percentage points.

GAO Sensitivity Analyses of the CIA's Comparison Estimate

We tested the impact that changes in either the ruble value of GNP or the purchasing power parities would have on the CIA's comparison estimate. We first examined the impact of changes affecting the ruble value of Soviet GNP by assuming (1) a 1-percent increase in hidden inflation in the aggregate industrial sector, (2) waste or loss of an additional 50 percent of agricultural products, and (3) a 10-percent increase in the ruble value of GNP resulting from assuming a larger second economy. We chose these three factors—hidden inflation, agricultural waste, and the second economy—because they have been cited by some experts as potential sources of error in the CIA's estimates.

We deliberately chose hypothetical assumptions that were considerably higher than those used by the CIA in order to clearly demonstrate the sensitivity of the results to changes in the assumptions. We found that these assumptions, taken individually, changed the comparison's final results by no more than 5 percentage points. Table I.1 depicts our findings.

Appendix I
Sensitivity Analyses of Soviet GNP Estimates

Table I.1: GAO Analysis of Impact of Changes in Ruble Estimate on Soviet Comparison

	Soviet GNP (1982 rubles in billions)	Soviet GNP as percent of U.S. GNP ^a
CIA baseline estimate for 1989	796	
Dollar based	66	
Geometric mean	51	
Ruble based	39	
Scenarios^b		
Additional 1-percent hidden inflation in industrial sector ^c	778	
Dollar based	65	
Geometric mean	50	
Ruble based	38	
Additional 50-percent waste in agriculture ^c	714	
Dollar based	60	
Geometric mean	46	
Ruble based	35	
10-percent increase due to second economy	876	
Dollar based	73	
Geometric mean	56	
Ruble based	43	

^aWe converted rubles to dollars with the CIA's two average purchasing power parities—\$2.03 and \$3.46 per ruble—and their geometric mean of \$2.65 per ruble. U.S. GNP in 1989 is \$4,144 billion in 1982 dollars.

^bThe effects of these scenarios are not cumulative.

^cWe used the CIA's 1982 weights for the industry and agriculture scenarios.

Our second test explored the impact that overstating the ruble's purchasing power would have on the comparison. The CIA has acknowledged that it may have overstated the ruble's purchasing power relative to the dollar's purchasing power by as much as 10 percent. We assessed the potential effect of such an overstatement as well as more significant overstatements.

We found that the CIA's results were relatively sensitive to changes in the purchasing power parity used. Table I.2 and figure I.1 show the impact that various changes in the purchasing power parities would have on the comparison of the two economies, expressed as the geometric mean as well as individual ruble and dollar comparisons.

Appendix I
Sensitivity Analyses of Soviet GNP Estimates

Table I.2: GAO Analysis of Impact of Changes in Parities on Soviet Comparison

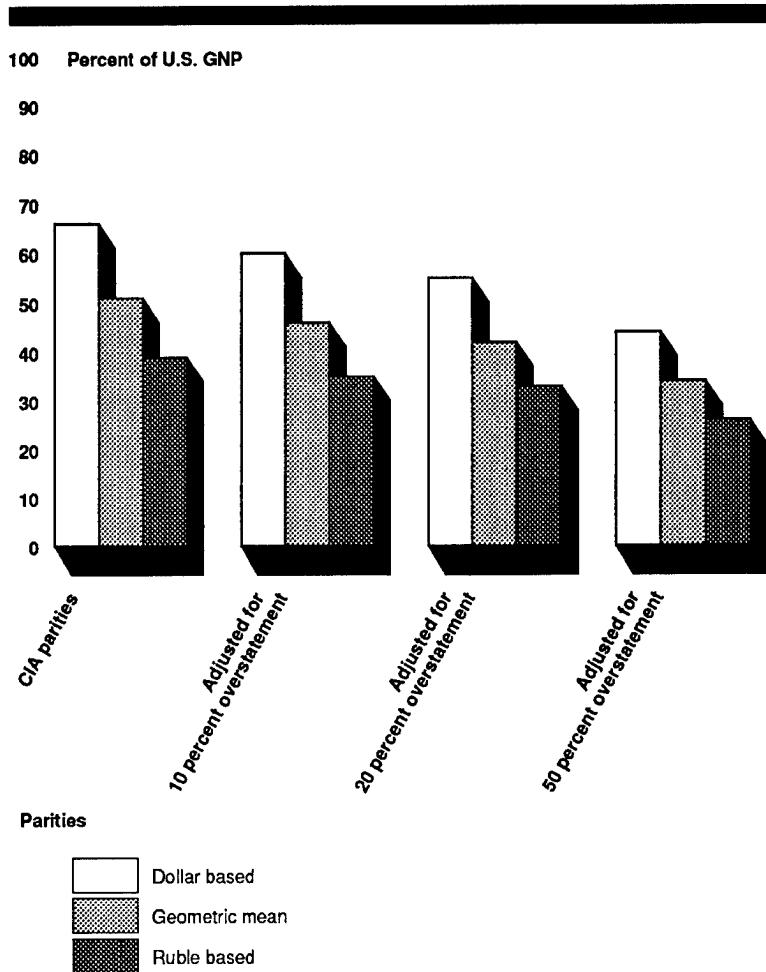
	Purchasing power parities	1989 Soviet GNP as percent of U.S. GNP ^a
CIA parities (1982 dollars per 1982 ruble)		
Dollar based	\$3.46	66
Geometric mean	2.65	51
Ruble based	2.03	39
Adjustment ^b of CIA parities to reflect ruble purchasing power overstatement of		
10 percent		
Dollar based	3.15	60
Geometric mean	2.41	46
Ruble based	1.85	35
20 percent		
Dollar based	2.88	55
Geometric mean	2.21	42
Ruble based	1.69	33
50 percent		
Dollar based	2.31	44
Geometric mean	1.77	34
Ruble based	1.35	26

^aBaseline Soviet GNP in 1989 is 796 billion rubles in 1982 rubles. Baseline U.S. GNP in 1989 is \$4,144 billion in 1982 dollars.

^bFor example, to calculate the effect of a 10-percent overstatement, the CIA dollar-based parity of \$3.46 is divided by 110 percent, resulting in an adjusted parity of \$3.15.

Appendix I
Sensitivity Analyses of Soviet GNP Estimates

Figure I.1: Impact of Parity Changes on Soviet Comparison



Due to the relative sensitivity of the comparison results to different parities, we attempted a limited test of the general plausibility of our hypothetical purchasing power parities. Our test was based on International Comparison Program (ICP) findings concerning the relationship between exchange rates and purchasing power parities. We used an exchange rate extrapolated from the Soviet commercial exchange rate, which was introduced in November 1990. The commercial exchange rate was then set at about 60 cents per ruble—substantially lower than the official exchange rate. According to the Soviets, the commercial rate is intended to be set at a rate that ensures that 90 percent of Soviet exports are profitable in rubles.

To determine what the commercial rate might have been if it had existed in 1989, we examined 1989-90 trends in Soviet foreign currency auctions and the Moscow black market for currencies. We found that the ruble had fallen in value in these markets by 120 percent and 60 percent, respectively. We therefore assumed that during the same period the commercial rate might have fallen by 90 percent—the average of 120 percent and 60 percent. If so, the commercial rate would have been roughly \$1.14 per ruble in 1989.

According to the ICP, countries with per capita gross domestic products that are 30 to 60 percent of U.S. gross domestic product tend to have purchasing power parities that are 50 percent higher than their currency exchange rates. If the Soviet Union fell within this category, and if the commercial exchange rate that we calculated for 1989 is analogous to the exchange rates in the ICP's analysis, then the 1989 dollar-ruble parity might have been roughly about \$1.71 per ruble. This result is similar to the \$1.77 parity that resulted from our assumption that the CIA had overstated the ruble's purchasing power by 50 percent, as shown in table I.2. Therefore, our test does not rule the possibility that the parity was roughly \$1.77 in 1989.²

However, this number (\$1.77) should not be interpreted as our estimate of the parity. Given the uncertainties associated with the data available to us and our methodology, it is not possible to accurately estimate the likely range of purchasing power parities for 1989.

²As shown in table I.2, this parity results in an estimate that is very similar to the 35 percent estimate that the CIA has testified is a conceivable lower boundary for the ratio of Soviet to U.S. GNP.

Comments From the Central Intelligence Agency

Central Intelligence Agency



Washington, D.C. 20505

21 August 1991

Mr. Frank C. Conahan
Assistant Comptroller General
National Security and International Affairs
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Conahan:

This is in response to your letter to Judge Webster that enclosed a copy of your draft report entitled Soviet Economy: Assessment of the CIA's Methods for Estimating the Size of the Economy.

The Agency greatly appreciates the opportunity to review this GAO report. We found the report to be a scholarly, credible, well-balanced appraisal that recognizes the great difficulties involved in analyzing the Soviet economy in the absence of reliable Soviet data.

Again, thank you for giving us the opportunity to review the report.

Sincerely,

A handwritten signature in black ink, appearing to read "Stanley M. Moskowitz".

Stanley M. Moskowitz
Director of Congressional Affairs

Major Contributors to This Report

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